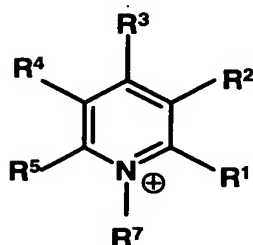


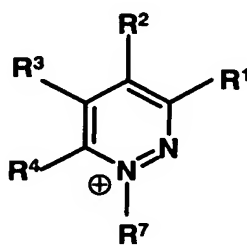
We claim:

1. A process for preparing haloalkanes by reaction of alcohol with hydrogen halide, wherein the reaction of the alcohol with the hydrogen halide occurs in the presence of an ionic liquid at a temperature which is above 100°C for at least part of the time and, at least at the time of commencement of the reaction, the water content is not more than 25 mol% based on the amount of ionic liquid, where the ionic liquid is not octyltrimethylammonium chloride.
2. A process as claimed in claim 1, wherein part or all of the hydrogen halide is passed into the mixture comprising the alcohol and the ionic liquid at temperatures below 100°C and the mixture formed by the addition is heated to temperatures above 100°C for part of the time.
3. A process as claimed in claim 1 or 2, wherein the reaction is carried out at from 110°C to 150°C.
4. A process as claimed in any of claims 1 to 3, wherein HCl or HBr is used as hydrogen halide.
5. A process as claimed in any of claims 1 to 4, wherein an alcohol selected from the group consisting of sec-butanol, isobutanol, 2-ethylhexanol, 2-propylheptanol, isononanol, cyclohexanol, cyclopentanol, glycol, 1,3-propanediol, 1,4-butanediol, 1,5-pentanediol, 1,6-hexanediol, neopentyl glycol, trimethylolpropane, pentaerythritol, glycerol, trimethylolethane, 1,2-propanediol, 1,2-butanediol, 2,3-butanediol, allyl alcohol, propargyl alcohol, diethylene glycol and triethylene glycol, in particular selected from the group consisting of 1,6-hexanediol, 1,5-pentanediol, 1,4-butanediol, 1,3-propanediol, glycol, allyl alcohol and propargyl alcohol, is used.
6. A process as claimed in any of claims 1 to 5, wherein an ionic liquid which comprises one each of the following cations and anions,

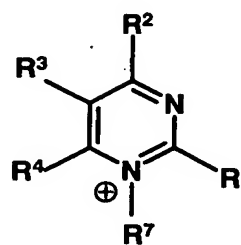
where the cation is selected from the group consisting of:



(a)

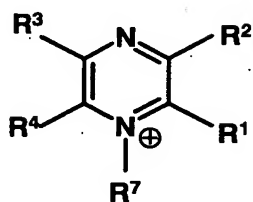


(b)

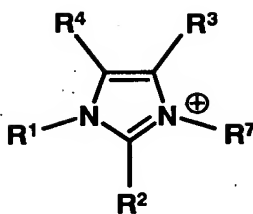


(c)

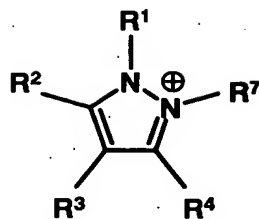
- 23 -



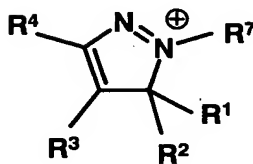
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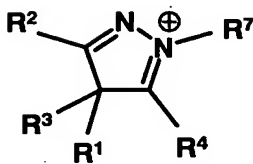
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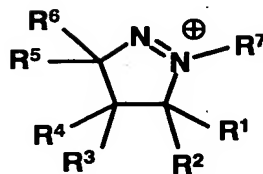
(f)



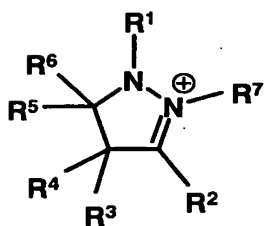
(g)



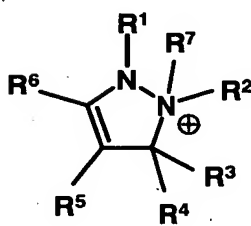
(h)



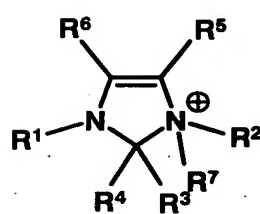
(i)



(j)

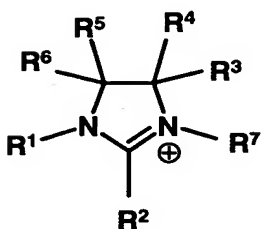


(k)

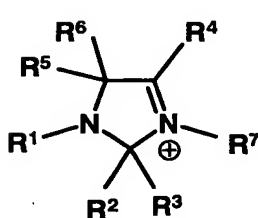


(l)

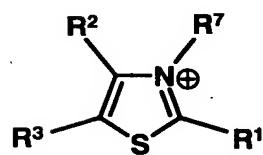
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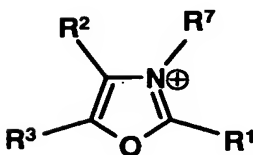
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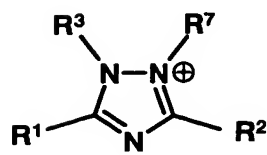
(n)



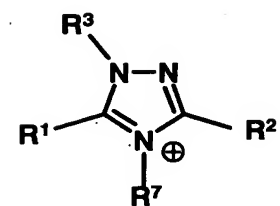
(o)



(p)

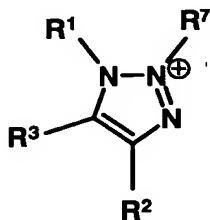


(q)

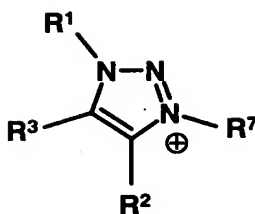


(r)

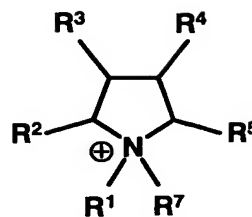
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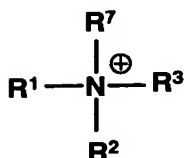
(s)



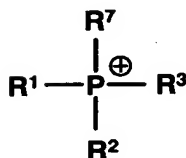
(t)



(u)



(v)



(w)

5

and also oligomers and polymers in which these structures are present,

where

10

$R^1$ ,  $R^2$ ,  $R^3$ ,  $R^4$ ,  $R^5$ ,  $R^6$  and  $R^7$  are each, independently of one another, hydrogen,  $C_1$ - $C_{18}$ -alkyl,  $C_2$ - $C_{18}$ -alkyl which may be interrupted by one or more oxygen and/or sulfur atoms and/or one or more substituted or unsubstituted imino groups,  $C_6$ - $C_{12}$ -aryl,  $C_5$ - $C_{12}$ -cycloalkyl or a five- or six-membered, oxygen-, nitrogen- and/or sulfur-containing heterocycle or two of them together form an unsaturated, saturated or aromatic ring which may be interrupted by one or more oxygen and/or sulfur atoms and/or one or more substituted or unsubstituted imino groups, where the radicals mentioned may each be, independently of one another, monosubstituted or polysubstituted by functional groups, aryl, alkyl, aryloxy, alkyloxy, halogen and/or heterocycles, with in the case of the ammonium ions (v),  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^7$  not all being an unsubstituted alkyl radical,

15

20

$R^7$  can also be  $C_1$ - $C_{18}$ -alkyloxy,  $C_1$ - $C_{18}$ -alkyloxycarbonyl,  $C_5$ - $C_{12}$ -cycloalkylcarbonyl or  $C_6$ - $C_{12}$ -aryloxy, where the radicals mentioned may each be, independently of one another, monosubstituted or polysubstituted by functional groups, aryl, alkyl, aryloxy, alkyloxy, halogen and/or heterocycles and

25

functional groups are: carboxyl, carboxamide, hydroxyl, amino,  $C_1$ - $C_4$ -alkylamino, di( $C_1$ - $C_4$ -alkyl)amino,  $C_1$ - $C_4$ -alkyloxycarbonyl, cyano or  $C_1$ - $C_4$ -alkyloxy,

and the anion is selected from the group consisting of:

30

halides, alkylcarboxylate, tosylate, sulfonate, dialkylphosphate, bis(trifluoromethylsulfonyl)imide, trifluoroacetate, triflate, sulfate, hydrogensulfate, methylsulfate, ethylsulfate, sulfite, hydrogensulfite, chloroaluminates, bromoaluminates, nitrite, nitrate, chlorocuprate, phosphate, hydrogenphosphate, dihydrogenphosphate, carbonate and hydrogencarbonate,

is used.

7. A process as claimed in any of claims 1 to 6, wherein an ionic liquid which comprises one each of the following cations and anions,

where the cation is selected from the group consisting of:

1-methylimidazolium, 1-ethylimidazolium, 1-propylimidazolium, 1-butylimidazolium, 2-ethylpyridinium, 1-ethyl-3-methylimidazolium, 1-n-butyl-3-ethylimidazolium, 1,2-dimethylpyridinium, 1-methyl-2-ethylpyridinium, 1-methyl-2-ethyl-6-methylpyridinium, N-methylpyridinium, 1-butyl-2-methylpyridinium, 1-butyl-2-ethylpyridinium, 1-butyl-2-ethyl-6-methylpyridinium, N-butylpyridinium, 1-butyl-4-methylpyridinium, 1,3-dimethylimidazolium, 1,2,3-trimethylimidazolium, 1-n-butyl-3-methylimidazolium, 1,3,4,5-tetramethylimidazolium, 1,3,4-trimethylimidazolium, 1,2-dimethylimidazolium, 1-butyl-2,3-dimethylimidazolium, 3,4-dimethylimidazolium, 2-ethyl-3,4-dimethylimidazolium, 3-methyl-2-ethylimidazolium, 3-butyl-1-methylimidazolium, 3-butyl-1-ethylimidazolium, 3-butyl-1,2-dimethylimidazolium, 1,3-di-n-butylimidazolium, 3-butyl-1,4,5-trimethylimidazolium, 3-butyl-1,4-dimethylimidazolium, 3-butyl-2-methylimidazolium, 1,3-dibutyl-2-methylimidazolium, 3-butyl-4-methylimidazolium, 3-butyl-2-ethyl-4-methylimidazolium, 3-butyl-2-ethylimidazolium, 1-methyl-3-octylimidazolium and 1-decyl-3-methylimidazolium,

and the anion is selected from the group consisting of:

halides, acetate, methanesulfonate, tosylate, sulfate, hydrogensulfate, phosphate, hydrogenphosphate, dihydrogenphosphate, dialkylphosphate and bis(trifluoromethylsulfonyl)imide,

is used.

8. A process as claimed in any of claims 1 to 7, wherein an ionic liquid selected from the group consisting of: 1-methylimidazolium chloride, 1-methylimidazolium bromide, 1-methylimidazolium fluoride, 1-methylimidazolium iodide, 1-methylimidazolium hydrogensulfate, 1-methylimidazolium sulfate, 1-methylimidazolium methanesulfonate, 1-methylimidazolium tosylate, 1-methylimidazolium diethylphosphate, 1-

ethylimidazolium chloride, 1-ethylimidazolium bromide, 1-ethylimidazolium fluoride, 1-ethylimidazolium iodide, 1-ethylimidazolium hydrogensulfate, 1-ethylimidazolium sulfate, 1-ethylimidazolium methanesulfate, 1-ethylimidazolium tosylate, 1-ethylimidazolium diethylphosphate, 1-propylimidazolium chloride, 1-propylimidazolium bromide, 1-propylimidazolium fluoride, 1-propylimidazolium iodide, 1-propylimidazolium hydrogensulfate, 1-propylimidazolium sulfate, 1-propylimidazolium methanesulfate, 1-propylimidazolium tosylate, 1-propylimidazolium diethylphosphate, 1-butylimidazolium chloride, 1-butylimidazolium bromide, 1-butylimidazolium fluoride, 1-butylimidazolium iodide, 1-butylimidazolium hydrogensulfate, 1-butylimidazolium sulfate, 1-butylimidazolium methanesulfonate, 1-butylimidazolium tosylate, 1-butylimidazolium diethylphosphate, 2-ethylpyridinium chloride, 2-ethylpyridinium bromide, 2-ethylpyridinium iodide, 2-ethylpyridinium hydrogensulfate, 2-ethylpyridinium sulfate, 2-ethylpyridinium methanesulfonate, 2-ethylpyridinium tosylate, 2-ethylpyridinium diethylphosphate, 1-ethyl-3-methylimidazolium chloride, 1-ethyl-3-methylimidazolium bromide, 1-ethyl-3-methylimidazolium fluoride, 1-ethyl-3-methylimidazolium iodide, 1-ethyl-3-methylimidazolium hydrogensulfate, 1-ethyl-3-methylimidazolium sulfate, 1-ethyl-3-methylimidazolium methanesulfonate, 1-ethyl-3-methylimidazolium tosylate, 1-ethyl-3-methylimidazolium diethylphosphate, 1-n-butyl-3-methylimidazolium chloride, 1-n-butyl-3-methylimidazolium bromide, 1-n-butyl-3-methylimidazolium fluoride, 1-n-butyl-3-methylimidazolium iodide, 1-n-butyl-3-methylimidazolium hydrogensulfate, 1-n-butyl-3-methylimidazolium sulfate, 1-n-butyl-3-methylimidazolium methanesulfonate, 1-n-butyl-3-methylimidazolium tosylate, 1-n-butyl-3-methylimidazolium diethylphosphate, 1-n-butyl-3-ethylimidazolium chloride, 1-n-butyl-3-ethylimidazolium bromide, 1-n-butyl-3-ethylimidazolium fluoride, 1-n-butyl-3-ethylimidazolium iodide, 1-n-butyl-3-ethylimidazolium hydrogensulfate, 1-n-butyl-3-ethylimidazolium sulfate, 1-n-butyl-3-ethylimidazolium methanesulfonate, 1-n-butyl-3-ethylimidazolium tosylate and 1-n-butyl-3-ethylimidazolium diethylphosphate,

in particular selected from the group consisting of: 1-methylimidazolium chloride, 1-methylimidazolium bromide, 1-methylimidazolium hydrogensulfate, 2-ethylpyridinium chloride, 2-ethylpyridinium bromide, 2-ethylpyridinium hydrogensulfate, 1-ethyl-3-methylimidazolium chloride, 1-ethyl-3-methylimidazolium bromide and 1-ethyl-3-methylimidazolium hydrogensulfate,

is used.

9. A process as claimed in any of claims 1 to 8, wherein the haloalkane is isolated from the reaction mixture by distillation.
10. A process as claimed in any of claims 1 to 9, wherein the ionic liquid has a melting point of less than 150°C, in particular less than 100°C.

11. A process as claimed in any of claims 1 to 10, wherein the reaction is carried out in the presence of from 1 to 3 mol of ionic liquid per mol of OH group to be reacted in the alcohol.
- 5 12. A process as claimed in any of claims 1 to 11, wherein the reaction is carried out in the absence of water or the substantial absence of water at the time of commencement of the reaction.
- 10 13. A process as claimed in any of claims 1 to 12, wherein the water liberated in the reaction is continuously removed, in particular distilled off.
14. A process as claimed in claim 13, wherein the water content in the reaction of the alcohol with the hydrogen halide is not more than 25 mol%, preferably not more than 20 mol%,  
15 more preferably not more than 10 mol%, particularly preferably not more than 5 mol%, based on the amount of ionic liquid, over the entire reaction time.
- 20 15. A process as claimed in any of claims 1 to 14, wherein in the case of the reaction of alcohols having more than one OH group per molecule, all OH groups are replaced by halogen.